


PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 1.004.025 WO		FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/NL2005/000164		International filing date (day/month/year) 07.03.2005		Priority date (day/month/year) 09.03.2004
International Patent Classification (IPC) or national classification and IPC INV. A22C13/00				
Applicant TOWNSEND ENGINEERING B.V. et Al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 10 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
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Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer Oltra García, R Telephone No. +31 70 340-3734		



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NL2005/000164

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-7 filed with telefax on 04.01.2006

Claims, Numbers

1-17 filed with telefax on 04.01.2006

Drawings, Sheets

1/2, 2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NL2005/000164

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	4-13,15,16
	No: Claims	1,2,3,14,17
Inventive step (IS)	Yes: Claims	4-13,,16
	No: Claims	1-3,14,15,17
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

1 Reference is made to the following document:

D1 : US 4 060 026 A (LOHR ALFRED ET AL) 29 November 1977

2 INDEPENDENT CLAIM 1

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT. Document D1 discloses (the references in parentheses applying to this document):

- Method for at least partially dehydrating (*) the casing of co-extruded food products (column 2, lines 61-65, this method is suitable for any kind of food products also co-extruded products), comprising the processing steps of: a) supplying an aqueous salt solution to the exterior of the co-extruded food products (column 3, lines 49-51); b) collecting the aqueous salt solution used during processing step a) (column 3, lines 53-55); c) reconditioning the collected aqueous salt solution (column 3, lines 33-39) such that it comprises forced evaporation of water (column 3, lines 32-34, the heating will cause evaporation, as the vessel 11 is open to the atmosphere- see fig. 1); and d) reusing aqueous salt solution with the processing step a) (column 3, lines 55-58). (cf. claim 1)

(*) As disclosed in D1, column 3, lines 40-45, the heated salt solution can also be brought into contact with the food after the steaming process has taken place. In such a case, once the product has been cooked in a saturated environment (no dehydration), the cooked and non-dehydrated product will suffer the (at least partially) dehydrating action of a salt solution with seasoning additives, as described in the application, page 1, 3rd paragraph.

3 INDEPENDENT CLAIM 14

3.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 15 is not new in the sense of Article 33(2) PCT.

Document D1 discloses (the references in parentheses applying to this document):

- A device for at least partially dehydrating (see point 2.1 above) the casing of co-extruded food products (see point 2.1 above) comprising: a brining system for co-extruded food products (column 3, lines 17-22); supply means (4, 4') for an aqueous salt solution connecting onto the brining system; and collecting means (column 3, lines 51-55) for the aqueous salt solution likewise connecting onto the brining system, wherein the device is also provided with reconditioning means (15 and 24) comprising heating means (24) for forced evaporation of the collected aqueous solution for reconditioning aqueous salt solution collected by the collecting means and feeding the supply means (4) with a reconditioned aqueous salt solution (column 3, lines 55-58). (cf. claim 1)

4 DEPENDENT CLAIMS 2-3, 14, 15, 17

Dependent claims 2-3, 14, 15 and 17 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

5 DEPENDENT CLAIMS 4-13 and 16

The additional features of dependent claims 4-13 and 16 are not disclosed in their present form in any of the documents cited in the search report.

Method and device for dehydrating co-extruded food products

The invention relates to a method for at least partially dehydrating the casing of co-extruded food products, wherein an aqueous salt solution is supplied to the exterior of the co-extruded food products. The invention also relates to a device for at least partially dehydrating the casing of co-extruded food products according the preamble of claim 14.

In the co-extrusion of food products the dough is extruded from a nozzle such that a dough strand is formed. Simultaneously with the extrusion of the sausage strand a skin (casing) is arranged around the dough strand, likewise by means of extruding a material suitable for the purpose, usually a collagen (often used in combination with a cross-linker or a liquid smoke extract added to the collagen for manufacturing the casing). Meat products (particularly sausages) are thus manufactured by means of simultaneous extrusion (co-extrusion), but it is likewise possible in this manner to manufacture vegetarian products with a non-animal casing. The material with which the casing is manufactured is viscous immediately after being arranged around the meat strand. In order to impart strength to the casing so that subsequent treatment and processing steps are possible, it is desirable to extract water from the casing as quickly as possible such that it cures.

For this purpose the co-extruded food product is brought into contact with an aqueous salt solution (also referred to as "brine", which usually consists of a solution of dipotassium phosphate in water), see for examples US 5,843,504 and US 5,989,609. For a more detailed description of the possible composition of such an aqueous salt solution, reference is for instance made to US 6,054,155 and WO 0141576. The aqueous salt solution can also be provided with one or more additives, for instance "liquid smoke" and/or a preparation for accelerating the curing. The existing process of extracting moisture from the encased food products dilutes the aqueous salt solution such that after some use the diluted aqueous salt solution has to be replaced. The aqueous salt solution can also become contaminated with liquid smoke and meat product components during processing. This replacement of the aqueous salt solution represents an overhead cost, wherein it is furthermore noted that costs are usually associated with the discharge of contaminated aqueous salt solution.

US patent 4,060,026 discloses an apparatus for adding salt or seasoning to food being cooked in steam cookers. The patent shows a cooker which serves to cook food by means of steam in an saturated environment. At the top of a cooking vessel nozzles are provided for spraying the food with a salt or seasoning solution and also a collecting vessel is provided for accommodating the (used) salt or seasoning solution. There is no reference in this application to food material with a viscous casing nor to a process of extracting moisture from food products to be cooked.

10 The object of the present invention is to provide a method and a device for limiting the waste flow resulting from the dehydration of the casing of co-extruded food products. It is also an object to make the dehydration of the casing of co-extruded food products less expensive.

15 To this end the invention provides a method for at least partially dehydrating the casing of co-extruded food products, according claim 1. As a result of dehydrating the co-extruded food products the salt concentration in the solution will decrease under normal process conditions, and the volume of the salt solution will also increase. The quality of the aqueous salt solution or brine will also deteriorate as a consequence of the increase
20 in the quantity of contamination in the solution, for instance in the form of dough portions (such as meat particles) and (fractions) of the casing material. It is noted that collection of the aqueous salt solution is understood to mean collection of the aqueous salt solution in the broadest sense of the word i.e. it designates any manner of bringing the solution together.

25 After some use the total volume of the aqueous solution has increased too much and/or the quality of the aqueous salt solution has deteriorated such that it is no longer usable or has less good properties and discharge is necessary. In order to prevent the contaminated aqueous salt solution now having to be removed as waste, the present
30 invention provides the option of enhancing the quality of the contaminated aqueous salt solution and recycling the reprocessed aqueous salt solution. Since the contaminated aqueous salt solution as described above contains an excess of water, reconditioning of the aqueous salt solution according to the present invention during processing step C) comprise forced evaporation of water out of the salt solution, which can be realized in

simple manner by heating the salt solution. This heating can for instance take place in combination with an under pressure. The salt solution can be brought to boiling point, but this is not essential. A drawback of heating the aqueous salt solution is that an additional undesired discolouration will hereby occur. The original clear and or yellow/brown aqueous salt solution will colour further brown, which makes it unacceptable for the skilled person in the field to continue dehydration with such a discoloured salt solution. This drawback is however also obviated by the present invention as will be elucidated below. Salt can also be added during the co-extrusion process in order to enhance the quality of the aqueous salt solution, but this provides only a limited solution as the contaminants are not hereby removed from the solution and because in this manner the total volume of the solution increases.

The collected aqueous salt solution is preferably also filtered. This is possible for instance via a paper filter or mechanical sieve, with the purpose of removing contaminants, such as meat portions, proteins or other solid contaminants, from the solution and thus enhancing the quality and lengthening the lifespan of the (reconditioned) solution. It is also possible to remove components from the solution by means of filtration such that discolouration of the solution during (re)conditioning is reduced or reversed, or discolouration is prevented.

In a specific filtration method at least one component is substantially removed from the aqueous salt solution by means of absorption and adsorption. An example hereof is the absorption of cross-linkers which have entered the aqueous salt solution as a result of the dehydrating, whereby discolouration of a salt solution can be reversed or prevented. An alternative which can optionally be applied in combination with absorption or adsorption is filtration in a manner such that by means of absorption or adsorption at least one component is substantially removed from the aqueous salt solution. Active carbon can herein be applied as filtration material.

In another method of combatting discolouration of the salt solution, an additive is added to the aqueous salt solution so as to prevent and/or at least partially reverse discolouration. Such an additive may comprise a strong oxidant, for instance hydrogen peroxide, fluorine, a hydroxyl radical, chlorine, chlorine dioxide, potassium permanganate, and/or ozone. The strong oxidant may also consist of a salt derivative of

a strong oxidant, such as for instance sodium percarbonate, calcium peroxide or magnesium peroxide, and/or of an acid derivative, such as for instance peracetic acid or peroxymonosulphuric acid. Coloured particles can be decolourized by means of the additive (for instance by subdividing) or formation of coloured particles in the solution can be prevented. In addition, other contaminants such as proteins are decomposed by the strong oxidant.

In yet another method of preventing or reversing discolouration of the aqueous salt solution, the salt solution is irradiated with a radiation such as ultraviolet. The radiation can act directly on the discolouration during reconditioning, but it is also possible to activate or catalyse an oxidizing agent and/or reactants with the radiation.

The invention also provides a device for at least partially dehydrating the casing of co-extruded food products according claim 14. With such a device the advantages can be realized as already described in the foregoing with reference to the method according to the present invention; the solution can be reused for a longer period than according to the prior art, without this having to result in unacceptable discolouration of the salt solution, while the salt concentration and the volume of the solution are ensured within determined limits.

In a preferred embodiment of the present invention, the reconditioning means comprise heating means for heating the collected aqueous salt solution. By means of forced evaporation of water out of the solution the salt percentage in the solution is increased, and the volume simultaneously reduced. Alternatives which can optionally be applied in combination with forced evaporation are for instance ultra filtration, reverse osmosis, electrolysis, deposition, flocculation, sintered metal filtration and so on.

In yet another preferred embodiment, the reconditioning means are provided with dispensing means for feeding an additive to the aqueous salt solution. The dispensing means can be placed in front of the heating means as well as behind the heating means as seen in the flow direction of the solution. In practice the reconditioning means will be disposed parallel to the normal circulation path of the brine, and a quantity of contaminated brine can thus be cleaned (batch-wise) for instance once a day. It is theoretically also possible, however, to envisage incorporating the reconditioning means

in the normal circulation path (i.e. they are placed in-line). A batch-wise processing of the contaminated brine is the more obvious if the brine is heated during reconditioning in order to evaporate water. The heating and evaporation of the brine does after all require the necessary time and energy, which would result in-line in great drawbacks.

- 5 The reconditioning means, optionally in combination with other means, can optionally be provided with irradiating means, and more particularly an ultraviolet source. The reconditioning means can likewise be provided with a filter, for instance a filter suitable for absorption and/or adsorption. The filter can be embodied as a filter for once-only use, for instance of paper, although it is also possible to embody the filter as a reusable
- 10 filter, for instance in the form of a metal sieve. It is also possible to envisage the combination of a number of filters with different filter characteristics placed in series.

The present invention will be further elucidated on the basis of the non-limitative exemplary embodiments shown in the following figures, in which:

- 15 figure 1 shows a schematic view of a device according to the invention, and figure 2 shows a view of an alternative embodiment variant of a device according to the invention.

- Figure 1 shows a device 1 for at least partially dehydrating a collagen casing 2 of a co-
- 20 extruded sausage strand 3. Sausage strand 3 is manufactured by simultaneously extruding (pressing) a strand of meat dough 5 and the collagen casing 2 from an extrusion head 4 in a direction as according to arrow P₁. Shortly after leaving extrusion head 4 the casing is still very viscous (soft) and therefore also vulnerable. In order to accelerate curing of casing 2 a highly concentrated brine (aqueous salt solution) 8 is
- 25 sprayed (atomized) over casing 2 with spray nozzles 6 forming part of a brining system 7. The brine 8 consists for instance of a dipotassium phosphate solution with a concentration of 10-60% by mass, more preferably 36-45% by mass of dipotassium phosphate.

- 30 Spray nozzles 8 of the brining system are fed by a feed line 9 to which brine is supplied from a supply tank 11 with brine 8 using a pump 10. Lying under spray nozzles 8 and sausage strand 3 is a collecting tray 12 with which is collected brine 13 which has been used for the dehydration and which is thereby contaminated. The atomized brine 13 is usually fed back by a discharge pipe 14 and a pump 15 to supply tank 11.

After a time the concentration of dipotassium phosphate in the solution will, as a result of the extraction of water from casing 2, be lower than the initial concentration, and the contamination of the brine with other substances and particles will also increase. By
5 displacing a control valve 25 a part of the (contaminated) brine can be carried batch-wise through a filter (sieve) 16 so as to thus remove contaminants from the brine 13. Filtered brine 13 is then transported to a reprocessing unit 17. The reprocessing unit 17 is provided with a vessel 18 in which heating coil 19 is placed. Through heating of the brine 13 a part of the water will disappear from the brine 13 as water vapour 20. A UV
10 radiator 21 is placed above vessel 18 in order to further stimulate the process of decolourizing of the contaminated brine 13. A feed 22 for an additive also connects onto vessel 18. The brine cleaned and concentrated in the reprocessing unit is finally fed back by a return line 23, and a pump 24, preferably after optional forced cooling of the brine, to supply tank 11, from where the brine 8 once again forms part of the regular
15 circulation circuit of the brine.

Figure 2 shows a device 40 for at least partially dehydrating a collagen casing 41 of a co-extruded sausage strand 42. In addition to a circuit 43 for reprocessing and recirculating contaminated brine 44, the device 40 is also provided with a return circuit
20 45. Device 40 is adapted for automated monitoring and adjustment of the quality of the brine present in the device. Placed in an outlet 46 connecting onto a collecting tray 47 for used brine 44 is a sensor 48 with which for instance the concentration of a specific substance, which functions as an indicator for the measure of contamination of brine 44, can be measured and transmitted via a signal line 49 to an intelligent control unit 50.
25 Depending on the level of contamination derived from the value measured by sensor 48, the intelligent control unit 50 will opt to open one of the circuits 43 or 45 by means of operating the valves 51, 52. At a relatively low level of contamination, the used brine 44 will be recycled in untreated state by return circuit 45. When control unit 50 detects that a minimum level of contamination has been exceeded, (a part of) the used brine 44 will
30 be treated by the reprocessing circuit 43 and be recycled. Most probable is that a part of the brine present in device 40 will be guided to reprocessing circuit 43, where after device 40 will switch back to "normal" circulation using the return circuit 45. The brine present in reprocessing circuit 43 can even be cleaned (reprocessed), while maintaining this normal circulation, to a higher level than the starting level of the brine. By

admixing the brine cleaned to a higher level with the remaining brine present in device 40, the quality of the brine present in the device (and therefore also the brine not carried through the reprocessing circuit 43) will increase. Conversely, it is also possible to envisage the control unit 50 cleaning at least a part of the brine present in device 40 by means of activating reprocessing circuit 43 when normal circulation through device 40 comes to a stop (for instance at the end of working hours). The quality of the brine can thus be increased to a desired level upon restarting of normal circulation through device 40.

Claims

1. Method for at least partially dehydrating the casing of co-extruded food products, comprising the processing steps of:
 - 5 A) supplying an aqueous salt solution to the exterior of the co-extruded food products,
 - B) collecting the aqueous salt solution used during processing step A),
 - C) reconditioning the collected aqueous salt solution such that it comprises forced evaporation of water out of the salt solution, and
 - D) reusing the reconditioned aqueous salt solution with the processing step A).
- 10 2. Method as claimed in claim 1, **characterized in that** the forced evaporation of water out of the salt solution comprises of heating the salt solution.
3. Method as claimed in claim 1 or 2, **characterized in that** the collected aqueous
15 salt solution is filtered.
4. Method as claimed in claim 3, **characterized in that** the collected aqueous salt solution is filtered in a manner such that at least one component is substantially removed from the aqueous salt solution by means of absorption.
- 20 5. Method as claimed in claim 3, **characterized in that** the collected aqueous salt solution is filtered in a manner such that at least one component is substantially removed from the aqueous salt solution by means of adsorption, for instance using active carbon.
- 25 6. Method as claimed in any of the foregoing claims, **characterized in that** an additive is added to the aqueous salt solution so as to prevent discolouration.
7. Method as claimed in any of the foregoing claims, **characterized in that** an
30 additive is added to the aqueous salt solution so as to at least partially reverse discolouration.
8. Method as claimed in claim 6 or 7, **characterized in that** the additive comprises a strong oxidant, such as hydrogen peroxide.

9. Method as claimed in claim 8, **characterized in that** the strong oxidant consists of a salt derivative of a strong oxidant, such as sodium percarbonate.

5 10. Method as claimed in claim 8, **characterized in that** the strong oxidant consists of an acid derivative.

11. Method as claimed in any of the foregoing claims, **characterized in that** the aqueous salt solution is irradiated in order to at least substantially prevent discolouration
10 thereof.

12. Method as claimed in any of the foregoing claims, **characterized in that** the aqueous salt solution is irradiated in order to at least substantially reverse discolouration of the aqueous salt solution.

15 13. Method as claimed in claim 11 or 12, **characterized in that** the irradiation takes place by means of ultraviolet radiation.

14. Device for at least partially dehydrating the casing of co-extruded food products,
20 comprising:

- a brining system for co-extruded food products,
- supply means for an aqueous salt solution connecting onto the brining system, and
- collecting means for the aqueous salt solution likewise connecting onto the brining system,

25 **characterized in that** the device is also provided with reconditioning means comprising heating means for forced evaporation of the collected aqueous salt solution for reconditioning aqueous salt solution collected by the collecting means and feeding the supply means with a reconditioned aqueous salt solution.

30 15. Device as claimed in claim 14, **characterized in that** the reconditioning means are provided with dispensing means for feeding an additive to the aqueous salt solution.

16. Device as claimed in claims 14 or 15, characterized in that the reconditioning means are provided with irradiating means.

17. Device as claimed in any of the claims 14-16, characterized in that the
5 reconditioning means are provided with a filter.